Remarks

The Office Action dated August 4, 2003 has been received and carefully studied.

The Examiner objects to the disclosure due to certain informalities. By the accompanying amendment, the term "nett" has been corrected to "net", the term GRP has been properly defined, and "an" has been corrected to "a" on page 9, line 24.

With respect to the term "nacelle", this term has been used to identify a separate enclosure. Applicant respectfully submits that the term is clear to the skilled artisan in reference to the specification and Figure 16. Moreover, Applicant is entitled to be his own lexicographer, and it is readily apparent from the specification and Figures what area of the device the nacelle 154 is referring to.

The term PERSPEX has been capitalized by amendment.

The Examiner rejects claims 1-9, 14-21 and 23 under 35 U.S.C. §112, second paragraph, as being indefinite for various reasons.

With respect to the Examiner's position that the language regarding the explosive charge defining boundary walls of the cavity is unclear or inaccurate, by the accompanying amendment the language has been modified to recite that the explosive charge defines at least one boundary wall of a cavity. It is believed that the amendment overcomes the rejection. Regarding the language of claim 8, the analogous language in claim 30 has been modified to eliminate the term "or".

Regarding claim 9, the analogous language in claim 31 is believed to be definite, as the location of the particulate material recited is expressly set forth. That there may be additional particulate material in the device is not the subject of the claim.

The Examiner rejects claims 1, 2, 7, 8, 14, 19 and 21 under 35 U.S.C. §102(b) as being clearly anticipated by Kray, U.S. Patent No., 2,972,948. The Examiner states that Kray discloses

a shaped charge projectile comprising a liner formed by an inner liner and an outer liner and aluminum powder contained within the inner and outer liner. The Examiner also rejects claims 1, 2, 5, 5-8, 14, 19 and 21 under 35 U.S.C. §102(b) as being clearly anticipated by Lips, U.S. Patent No. 5,259,371, and claims 1-3, 5-8, 14-16, 19 and 21 under 35 U.S.C. §102(b) as being anticipated by German Patent 1,136,920, claims 3 and 6 under 35 U.S.C. §103(a) as being unpatentable over Kray, claim 4 as being unpatentable over Kray or German '920 in view of German '746, claim 9 as being unpatentable over Kray or German '920 in view of Evans, Jr, claim 17 as being unpatentable over Kray, Lips or German '920 in view of German '491, and claim 18 as being unpatentable over Kray, Lips, German '920 in view of German '491 and Christmann et al.

By the accompanying amendment, claims 1-18, 20 and 22-23 have been cancelled. Claim 19 has been amended by incorporating therein the limitations of claim 20. New claims 24-36 have been added corresponding to claims 2-9 and 14-18. The new claims read on the elected embodiment.

The Examiner also rejects claims 20 and 23 under 35 U.S.C. §103(a) as being unpatentable over Kray, Lips or German '920 in view of Manhart. The Examiner admits that none of the primary references discloses using an explosive device for avalanche control, and cites Manhart as teaching that it is old and well known to use an explosive device for avalanche control. The Examiner concludes that it would have been obvious to employ the shaped charged devices of either of the primary references for avalanche control as taught by Manhart.

The rejection is respectfully traversed to the extent applicable to the amended claims and claims newly presented.

Charges used for avalanche control are generally those for which the blast is omni-directional, so a large volume of the snow/ice is disturbed as well as the ground to cause loosening vibrations to trigger the avalanche in a controlled manner. These are typically a mass of explosive that is

detonated, as in the applicant's co-pending application, for example.

The present invention as now claimed relates to what are often called "hollow charges" in which a cavity is formed in the explosive mass, the cavity is lined, e.g., by a metal cone, and the explosive triggered at the end of the charge opposite the line. By suitable design of detonator the shock waves converge on the liner and cause it to collapse inwardly on itself. A great deal of the blast energy is thereby concentrated in the liner which is consequently ejected along the axis of the conical liner as a molten metal "jet" travelling at supersonic speed. That is, the purpose of a hollow charge is to provide a highly directional transfer of the blast energy that is conveyed to a target by the jet. (This jet formation is called the Munroe effect.)

The usual use for such hollow charges is to penetrate hard and/or thick metal plates by means of the highly focused application of the blast energy in the form of a jet which cuts into the metal rather as a jet of water into sand, for example tank armour. The better the design of a hollow charge, the more effective and concentrated is the high energy jet.

Although some blast energy will be radiated other than in the jet of molten metal, it will be appreciated that a hollow charge has the opposite characteristic blast pattern to that required for avalanche control. For example, if a hollow charge were detonated by an ice cornice and the blast aimed at it, it could simply result in a thin hole being blasted through the ice with virtually no energy transferred to the ice (a bit like pushing a needle through a snowball).

A hollow charge would have some useful blast energy for disturbing ice/snow if it were directed at the ground, albeit inefficient due to its high localization and, indeed, hollow charges have been used for this purpose in the past. However, this use was not because the hollow charges were preferred, but for convenience in that ex-military should launched anti-armour weapons are occasionally used for avalanche use as they can be used against relatively inaccessible target points

and they use hollow charges as standard ammunition despite the lower efficiency of such charges for avalanche use. This is as acknowledged in the specification at page 4.

The present invention as now claimed is a method of blasting an ice/snow target by use of a hollow charge, of the type recited in the claims, in which the 'particulate material" is selected to be one which reacts with the ice/snow target. This arrangement has the effect described at page 4, last two lines and following. That is, the hollow charge as claimed and used against snow/ice produces a blast having a large component which is not directed along the jet axis but has significant lateral spread, as illustrated in the Figures 3 to 11 and 13 and as described in the corresponding portions of the description.

The present invention thereby provides an effective avalanche control device from what would otherwise be a relatively inefficient hollow charge device for this type of use.

The mechanism of the charges of the three primary references is that the materials int he liner (including metal particles, binder, etc.) react together on detonation of the respective charges to produce an exo-thermic reaction to produce a higher temperature of jet, and so increasing effectiveness at the point of impact of the jet on the target, e.g., metal armour plate. In contrast, the present invention as claimed requires the material in the jet to be reactive with the surrounding water of ice/snow, i.e., which is not inter-reactive with another material of the explosive device itself. The use of any of these devices for avalanche control would therefore not be as now claimed, so the present invention as claimed would not be arrived at even if the combination with Manhart was somehow made.

It is to be noted that when a hollow charge is used for avalanche control, the invention is for the jet to impact the ground to cause vibration to trigger an avalanche and if any target damage enhancement was to be contemplated in the context of avalanche control, it would have been in the

context of enhancing the jet/ground interaction. However, the present invention as claimed departs markedly from this approach, by using the energy of jet formation to heat material in the jet which will interact with the snow/ice and not the ground so taking energy from the jet that could otherwise have been transferred to the ground in order to produce a lateral blast effect. This is counter to the teachings of the cited references, and is nowhere suggested by them alone or in combination.

This modification departs entirely from the reason hollow charges such as Kray were designed (for armour penetration) and in an inherently non-obvious fashion are modifications that reduce the point penetration characteristics of these prior art devices. Thus, Kray concentrates specifically on enhancing the penetration potential of the shaped charged mechanism by enhancing the explosive force of the shaped charge. In the present invention, the application of the Munroe effect achieves the opposite of a penetration, in that it is designed specifically to trade penetration with an effectively instantaneous energetic interaction between the jet products formed by the shaped charge liner and material elements present within the target. It exploits the intense level of kinetic energy vested in the high velocity jet products induced through the collapse of a specially formulated shaped charge liner by stimulating a chemical reaction between the hydrogen and oxygen contained within the water in the target and the reactive matter contained within the impacting jet.

The design and use of a hollow charge to provide lateral blast effects by introduction of the jet with the snow/ice through which the jet travels is an entirely new one and one not at all taught or suggested by the prior art.

Applicants further note that in the present invention, the "target" refers to the snow/ice, whereas in the case of Kray (and prior art hollow charges used in relation to avalanche control) the target is the ground, as little energy is transmitted from the jet to the snow/ice with prior art devices. Thus, the hollow charge of the invention targets the snow/ice but will have a bonus ground-vibrating

effect if the jet strikes the ground. Were the prior art devices to target the snow/ice and not the ground, they would be very inefficient at triggering an avalanche.

Reconsideration and allowance are respectfully requested in view of the foregoing.

Respectfully submitted,

Kevin S. Lemack
Reg. No. 32,579
176 E. Main Street
Westboro, Massachusetts 01581
TEL: (508) 898-1818